

Claims

- [c1] 1.A computer implemented method for enabling at least one of field service of machines and training of field service personnel comprising:
generating at least one validated sequence of actions for at least one maintenance task;
validating said at least one sequence in a virtual environment; and,
delivering said at least one validated sequence for use in performing said at least one maintenance task.
- [c2] 2.The method of claim 1 wherein the delivering step comprises providing natural language instructions
- [c3] 3.The method of claim 2 wherein said natural language instructions comprises at least one of written instructions, voice instructions and animated exploded view video instructions.
- [c4] 4.The method of claim 1 wherein the generating step imports engineering data comprising a Computer Aided Design (CAD) model.
- [c5] 5.The method of claim 1 wherein the generating step comprises:
importing said engineering data;
determining mating interfaces of a plurality of component parts within a given assembly;
creating at least one component part removal path for at least one of said component parts; and,
generating said at least one sequence of instructions responsive to said creating step.
- [c6] 6.The method of claim 5 further comprising repeating said generating step to generate a plurality of sequences.
- [c7] 7.The method of claim 1 wherein said validating step is performed with a haptic interface.
- [c8] 8.A computer implemented method for enabling at least one of field service of machines and training of field service personnel comprising:

generating at least one sequence of actions for at least one maintenance task;
 validating said at least one sequence can be performed by said field service
 personnel; and,
 delivering said at least one sequence for use in performing said at least one
 maintenance task.

- [c9] 9.The method of claim 8 wherein the validating step provides feedback to the
 generating step.
- [c10] 10.The method of claim 8 wherein the delivering step comprises providing
 written instructions.
- [c11] 11.The method of claim 8 wherein the delivering step comprises providing
 alternate instruction presentation such as voice instructions.
- [c12] 12.The method of claim 8 wherein the delivery step comprises providing
 animated exploded view video instructions.
- [c13] 13.The method of claim 8 wherein the generating step imports engineering data
 comprising a Computer Aided Design (CAD) model.
- [c14] 14.The method of claim 8 wherein said validating step is performed in a virtual
 environment.
- [c15] 15.The method of claim 8 wherein said validating step is performed with a
 haptics interface.
- [c16] 16.The method of claim 8 wherein the generating step comprises:
 importing engineering data from a Computer Aided Design (CAD) model;
 determining mating interfaces of a plurality of component parts within said CAD
 model;
 creating at least one component part removal path for at least one of said
 component parts in a given exploded view; and,
 generating said at least one sequence of instructions responsive to said creating
 step.
- [c17] 17.The method of claim 16 further comprising repeating said generating step to

generate a plurality of sequences.

- [c18] 18.A system for enabling at least one of field service of machines and training of field service personnel comprising:
- an engineering data generating device adapted to compute and provide engineering data relating to said machines;
 - a service sequence generator adapted to import and process said engineering data to generate at least one sequence of instructions for at least one maintenance task;
 - an automated generating device adapted to convert said at least one sequence of instructions into natural language instructions for use in said at least one maintenance task;
 - a validating device adapted to verify said natural language instructions; and,
 - a delivery device adapted to deliver said natural language instructions to said field service personnel.
- [c19] 19.The system of claim 18 wherein said engineering data generating device is a Computer Aided Design (CAD) system and said engineering data comprises at least one of CAD models and engineering drawings.
- [c20] 20.The system of claim 18 wherein said automated generating device produces human-readable instructions for said maintenance tasks.
- [c21] 21.The system of claim 18 wherein said human-readable instructions comprise at least one of written instructions, voice instructions and animated exploded view video instructions.
- [c22] 22.The system of claim 18 wherein said validating device comprises a haptics device.
- [c23] 23.The system of claim 18 wherein said service sequence generator is further adapted to generate a plurality of collision-free part removal paths for said at least one sequence of instructions.
- [c24] 24.The system of clam 18 wherein said delivery device is further adapted to permit said service personnel to select a desired format for said instructions.

Variable	Mean	SD	Min	Max
Age	38.5	12.5	25	65
Gender				
Male	55.2	5.1	45	65
Female	44.8	5.2	35	55
Marital status				
Married	68.5	6.5	55	85
Single	31.5	6.5	15	45
Education				
High school	15.2	2.5	10	20
College	45.8	3.5	35	55
Postgraduate	39.0	4.5	25	55
Income				
Low	12.5	3.5	5	20
Medium	45.2	4.5	35	55
High	42.3	5.5	35	55
Occupation				
Manager	35.5	4.5	25	45
Professional	45.2	5.5	35	55
Service	19.3	3.5	10	30
Unemployed	0.0	0.0	0	0
Health status				
Good	65.2	5.5	55	75
Fair	34.8	5.5	25	45
Poor	0.0	0.0	0	0
Smoking status				
Smoker	25.5	4.5	15	35
Nonsmoker	74.5	4.5	65	85
Alcohol consumption				
Regular	15.2	3.5	5	25
Occasional	35.5	4.5	25	45
Never	49.3	5.5	35	60